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Exploring hysterosalpingography findings and pregnancy results among women applying to a tertiary referral hospital

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ABSTRACT

Aims: To find out the correlation between hysterosalpingography (HSG) pathologies and pregnancy results of infertility patients. Infertility is a complicated complaint prevalent among women of reproductive age with severe financial and social consequences. HSG, adopted for evaluating infertility, can be considered a secondary imaging technique in practice following ultrasound examination. The present study attempted to explore the HSG results of patients applying to our hospital with the complaint of infertility in the last two years and to compare these results with their pregnancy.

Methods: We retrospectively evaluated the HSG results of the patients applying to or referred to our hospital from an external center between 10.01.2018 and 30.08.2020 with the complaint of infertility.260 patients were included in the study. The patients were grouped by their primary and secondary infertility. We analyzed anomalies detected by HSG in two groups: uterine and tubal anomalies. Moreover, those becoming pregnant following HSG until June 2022 were grouped by reproductive techniques (spontaneous or assisted). Patients not having optimal imaging, with HSG reports obtained at an external center, and with insignificant results were excluded from the study.

Results: The patients' mean age was calculated to be 36 years (21-52 years). While 144 patients (55%) were diagnosed with primary infertility, 116 (45%) had a diagnosis with secondary infertility. There was no uterine or tubal anomaly in 157 patients undergoing HSG, but we discovered only a uterine defect in 28 of 103 patients and a tubal defect including at least one uterine and comorbid tuba in 44 patients. In 45 patients with a uterine anomaly, the most prevalent HSG findings were uterine filling defect (28 patients, 62.2%) and arcuate uterus (10 patients, 22.2%). We also discovered that 81 patients became pregnant at least once after HSG. While 50 of them got pregnant spontaneously, the remaining benefitted from assisted reproductive techniques. Our findings showed spontaneous pregnancy not to be associated with primary or secondary infertility (p=0.394; OR=0.765; 95% CI: 0.412-1.42). There was also no relationship between primary and secondary infertility and abnormal HSG findings (p=0.437; OR=0.820; 95% CI: 0.498-1.35). Finally, we concluded that abnormal HSG findings did not significantly contribute to the rate of spontaneous pregnancy (p=0.701; OR=1.13; 95% CI: 0.604-2.11).

Conclusion: We concluded that abnormal HSG findings did not contribute to the rates of spontaneous pregnancy.

Keywords: Infertility, hysterosalpingography , spontaneous pregnancy

INTRODUCTION

Fertility is defined as the clinical capacity of a woman of reproductive age to produce a pregnancy. Infertility, on the other hand, is a disorder characterized by the inability to have a clinical pregnancy following 12 months of regular and unprotected sexual intercourse, or the deterioration of the reproductive capacity of the individual or with their partner.[1] Therefore, it may be considered amultifaceted disorder with severe financial, psychological, and social consequences. The relevant research demonstrates that 10-15% of couples worldwide (49-72 million on average) struggle with infertility.[2–4] Whereas Turkey's infertility rate seems to be declined from15% to 8.1%, between 1993-2013.[5] Infertile women are often divided into two groups by means of previous pregnancy success: Primary and Secondary infertile women. Recent data have revealed that secondary infertility is the most prevalent form of female infertility worldwide, particularly in developing countries with high rates of unsafe abortions and inadequate postpartum maternity care.[6–8]

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Ovulation disorders (27%), male factors (25%), and tubal/uterine factors (22%) are known to be the most common causes of infertility.[9] Evaluation of infertility basically includes evaluation of ovulation, female reproductive system anatomyand male-related factors. While the very first method applied to reveal male-related factors is sperm analysis, the evaluation of ovulation relies on ultrasound imaging of the ovaries examination and laboratory tests for Follicle Stimulating Hormone (FSH), estradiol, anti-mullerian hormone (AMH), thyroid stimulating hormone (TSH), prolactin (PRL), and androgens. Evaluation of pelvic anatomy is based on revealing tubal and uterine factors by radiological imaging techniques. Transvaginal ultrasonography (TVS) and hysterosalpingography (HSG) are two standard imaging techniques in practice due to their convenience and accessibility. TVS is known to be highly sensitive, specificand accurate in detecting uterine anomalies or polyps but limited in evaluating tubal abnormalities. A previous study reported the sensitivity and specificity of HSG in detecting tubal occlusions to be 65% and 83%, respectively.[10] HSG is capable of defining the condition of tubes, it also informs about the morphology of the uterus, its contours, the uterine cavity, and even the width of the cervical canal.[11] Uterine anomalies account for about 10% of female subfertility.[12] In the HSG technique, endometrial polyps, fibroids, or intrauterine adhesions may present with filling defects in the uterine cavity or irregular uterine contour. It was suggested that HSG has a therapeutic role in increasing subfertility.[13]

The present study aimed to explore the HSG results of the patients applied to our hospital with the complaint of infertility in the last two years and to evaluate the relationship between these results by the patients' infertility types and pregnancy outcomes following HSG.

METHODS

The study was carried out with the permission of İstanbul Medeniyet University Göztepe Training and Research Hospital Noninvasive Clinical Researches Ethics Committee (Date: 02/09/2020, Decision No: 2020-0572). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki. All patients signed the free and informed consent form.

We retrospectively evaluated the HSG results of the patients applying to or referred to our hospital from an external center between 10.01.2018 and 30.08.2020 with the complaint of infertility. 260 patients were included in the study The patients were grouped by age, gravida, parity, previous ectopic pregnancy, previous tubal or uterine surgery, primary or secondary infertility, and causes of infertility (unexplained infertility, polycystic ovary syndrome, endometrioma, and male factor). Moreover, HSG results were grouped as tubal and uterine anomalies (arcuate uterus, uterus didelphys, filling defect in the cavity, hypoplastic uterus, uterine septum, etc.). We also grouped tubal anomalies by unilateral (right or left tubal occlusion) or bilateral tubal occlusions. 81 of 260 patients becoming pregnant following HSG until June 2022 were grouped by reproductive techniques (spontaneous or assisted).

Iohexol (a 50 ml water-soluble non-ionic radiopaque substance) had injected through the cervix during HSG. Then, the distribution of the radiopaque substance to the cervix, uterine cavity, and fallopian tubes and its passage from the tubes to the peritoneum had observed and recorded with the help of simultaneous radiographic imaging.

Patients who did not have optimal imaging reports, whose HSG reports were obtained at an external center and the ones with unclear results, patients with any endocrine abnormality, patients desiring IVF treatment in the following 6-12 months and whose partners had abnormality in semen parameters with TPMSS<1 million were excluded from the study.

Statistical Analyses

In statistical analyses, we considered a p-value < 0.05 to be significant. We used Chi-square test for correlation analysis.

RESULTS

Table 1 presents the patients' demographic characteristics. Accordingly, their mean age was calculated to be 36 years (21-52 years). While 144 patients (55%) were diagnosed with primary infertility, 116 (45%) had a diagnosis with secondary infertility. There was no uterine or tubal anomaly in 157 patients undergoing HSG, but we discovered only uterine defect in 28 of 103 patients with anomalies and a tubal defect including at least one uterine and comorbid tuba in 44 patients. We observed tubal defects in 75 patients (72.8%): 18 (17.4%) with bilateral and 57 with unilateral tubal defects. The right tubal filling defect was the most common in 52 patients. In 45 patients with a uterine anomaly, the most prevalent HSG findings were uterine filling defect (28 patients, 62.2%) and arcuate uterus (10 patients, 22.2%), followed by uterus didelphys in two patients, hypoplastic uterus in one patient, uterine septum in one patient, T-shaped uterus in one patient, bicornuate uterus in one patient, and concurrent transverse vaginal septum in one patient with filling defect in the cavity. We also discovered that 81 patients became pregnant at least once after HSG. While 50 of them got pregnant spontaneously, the remaining benefitted from assisted reproductive techniques. While 25 (17.3%) of 144 primary infertile patients had spontaneous pregnancy, it was discovered in 25 (21.5%) of 116 secondary infertile patients. As shown in **Table 2**, our findings showed spontaneous pregnancy not to be associated with primary or secondary infertility (p=0.394; OR=0.765; 95% CI: 0.412-1.42). Of 103 patients with abnormal HSG findings, 54 (52.4%) were primary infertile, and 49 (47.5%) were secondary infertile. There was also no relationship between primary and secondary infertility and abnormal HSG findings (p=0.437; OR=0.820; 95% CI: 0.498-1.35) (**Table 3**). Of 21 patients with an abnormal HSG findings who became pregnant spontaneously, 8 (38%) were found to be primary infertile and 13 (62%) to be secondary infertile. Finally, we concluded that abnormal HSG findings did not significantly contribute to the rate of spontaneous pregnancy (p=0.701; OR=1.13; 95% CI: 0.604-2.11) (**Table 4**)

Table 1. Patients' demographic characteristics

	n (%)
Age (years)	36 (21-52)
Feature of infertility	
Primary	144 (55%)
Secondary	116 (45%)
HSG result	
Normal	157 (60.3%)
Abnormal	103 (39.7%)
Uterine anomaly	45 (43.6%)
Filling defect	28 (62.2%)
Arcuate uterus	10 (22.2%)
Tubal anomaly	75 (72.8%)
Unilateral	57 (76%)
Bilateral	18 (24%)
Only uterine anomaly	28 (27.1%)
Uterine anomaly and at least one tubal anomaly	44 (42.7%)
Pregnancy following HSG	
No	179 (68.8%)
Yes	81 (31.2%)
Spontaneous pregnancy	50 (61.7%)
Pregnancy with assisted reproductive techniques	31 (38.3%)

HSG: Hysterosalpingography

Table 2. Spontaneous pregnancy following HSG - primary/secondary infertility relationship

Spontaneous pregnancy	Feature of infertility		Total	p-value p =0.394
	Secondary	Primary		
No	91 (43.3%)	119 (56.7%)	210 (100%)	
Yes	25 (50.0%)	25 (50.0%)	50 (100%)	
Total	116 (44.6%)	144 (55.4%)	260 (100%)	

HSG: Hysterosalpingography, (p=0.394; OR=0.765; 95% CI: 0.412-1.42)

Table 3. Abnormal HSG Findings- primary/secondary infertility relationship

Abnormal HSG Findings	Feature of infertility		Total	p-value p =0.437
	Secondary	Primary		
No	67 (42.7%)	90 (57.3%)	157 (100%)	
Yes	49 (47.6%)	54 (52.4%)	103 (100%)	
Total	116 (44.6%)	144 (55.4%)	260 (100%)	

HSG: Hysterosalpingography, (p=0.437; OR=0.820; 95% CI: 0.498-1.35)

Table 4. Abnormal HSG Findings- spontaneous pregnancy relationship

Abnormal HSG Findings	Spontaneous pregnancy		Total	p-value p =0.701
	No	Yes		
No	128 (81.5%)	29 (18.5%)	157 (100%)	
Yes	82 (79.6%)	21 (20.4%)	103 (100%)	
Total	210 (80.8%)	50 (19.2%)	260 (100%)	

HSG: Hysterosalpingography, (p=0.701; OR=1.13; 95% CI: 0.604-2.11)

DISCUSSION

Infertility rates vary by region across the world,[14] but recent years have witnessed a decrease in primary and secondary infertility rates in developed countries. Secondary infertility is considered the most prevalent form of female infertility worldwide.[15] Contrary to epidemiological research, the distribution of primary and secondary infertile patients in this study was found to be 52.4% and 47.6%, respectively.

HSG is a minimally invasive imaging frequently adopted in evaluating uterine cavity shape and size, uterine anomalies, and tubal pathologies in infertile women.[16] When compared to a similar study, although tubal pathologies were among the most common anomalies in HSG with 72%,[17] we discovered them to be higher in our primary infertile patients. Another study, including 120 infertile patients, concluded that the most common anomalies in HSG were related to tubal pathologies and that the patients had primary infertility the most.[18]

We discovered spontaneous pregnancy in 20.3% of patients with abnormal HSG findings, and among them, 62% were determined to be secondary infertile. In a meta-analysis comparing normal and abnormal findings in HSG and pregnancy rates, it was uttered that abnormal findings in HSG, except for bilateral tubal obstruction, were insufficient to determine the pregnancy prognosis.[19] Another study comparing laparoscopy and HSG in the diagnosis of tubal factors emphasized that HSG remains limited but diagnostic laparoscopy appears to be the gold standard diagnostic method in determining tubal occlusions and that false positive findings in HSG should not be ignored.[20]

Relying on the hypothesis that HSG has therapeutic effects as well as being a diagnostic tool, a Netherlands-based comprehensive prospective cohort study[13] calculated the probability of spontaneous pregnancy in the six-month period following HSG to be 15% and 21% for patients having HSG with the complaint of infertility with those not having HSG, respectively, promoting the hypothesis that HSG has possible therapeutic effects. However, more randomized controlled studies are needed on the subject since the patients were not randomized in the mentioned study. When it comes to our findings, we determined that abnormal findings in HSG did not change the rates of spontaneous pregnancy. The variability of the false positivity and negativity rates of HSG in diagnosing tubal pathologies, congenital anomalies, intra-abdominal adhesions, and uterine pathologies or the possible therapeutic effects of HSG may be associated with spontaneous pregnancies following HSG in patients with anomalies.

A study, investigating the pregnancy rates following HSG among 100 primary and secondary patients, found spontaneous pregnancy to be significantly associated with primary and secondary infertility,[21] which is not promoted by our findings.

The present study is not free of a few limitations. For example, the sample size was relatively small. Moreover, we took for granted the adequacy of HSG while evaluating abnormal HSG results. However, we did not utilize diagnostic laparoscopy or MRI to confirm tubal and uterine anomalies.

CONCLUSION

While secondary infertility is considered the most common form of female infertility worldwide, primary infertile patients constituted the majority of our patient group. Overlapping with the literature, the most common abnormal HSG finding was found to be a tubal pathology. We also concluded that abnormal HSG findings did not contribute to the rates of spontaneous pregnancy. Abnormal HSG findings, except for bilateral tubal obstruction, are deemed insufficient to determine pregnancy prognosis due to the high false positivity and negativity rates in HSG.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of İstanbul Medeniyet University Goztepe Training and Research Hospital Noninvasive Clinical Researches Ethics Committee (Date: 02/09/2020, Decision No: 2020-0572).

Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process: Externally peer-reviewed.

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